Statement of Opinions
Wayne M. Grip
President
Aero-Data Corporation

Illinois River Watershed

Case No.: 4:05-cv-00329-GKF-SAJ
United States District Court
Northern District of Oklahoma

In the Matter of

State of Oklahoma, ex rel. W.A. Drew Edmondson, in his capacity as Attorney General of the State of Oklahoma and Oklahoma Secretary of the Environment C. Miles Tolbert, in his capacity as the Trustee for Natural Resources for the State of Oklahoma

v.

Tyson Foods, Inc., Tyson Poultry, Inc., Tyson Chicken, Inc. Cobb-Vantress, Inc., Aviagen, Inc., Cal-Maine Foods Inc., Cal-Maine Farms Inc., Cargill Inc., Cargill Turkey Production, LLC, George's Inc., George's Farms, Inc., Peterson Farms Inc., Simmons Foods, Inc., and Willow Brook Foods, Inc.

January 2009

Wayne M. Grip

EXHIBIT
tabbies
B

Assignment
Since the submission of my October 2008 report on the Illinois River Basin, I have been asked to quantify the volume of sediments eroded from the river banks from the 1970's to the present. In my 2008 report, I used historical maps and aerial photography to map the channel of the Illinois River over time so as to identify those areas where the position of the channel had shifted (meandered). The 2008 report contained exhibits of the aerial photography, maps I obtained and channel locations I mapped.

Methods
In order to accomplish this additional task, I have used the channel mapping from my previous report to identify the stream reaches where active meanders were present at some time during the period of the study. A photomission of those reaches was then flown in December 12, 2008 from an elevation of 3,000 feet above terrain using my company airplane, 9" aerial mapping film camera and flight crew. Multiple east/west flight lines were flown with three or more overlapping exposures per flight line. I chose not to fly the eastern half of the river, because I had found little evidence of active meanders and channel movement in my 2008 study.

The exposed film was then processed, scanned and the resulting digital images were georegistered in the same coordinate system as the historical aerial photography and maps in my previous study. The current position of the river channel was then mapped in those reaches which had just been photographed.

The current mapped position of the river channel merged with the post 1972 mapped channel locations was then compared to the 1972 river channel using a Geographic Information System (GIS). The surface area of channels falling outside the 1972 channel locations was determined. This surface area represents all the areas cut by channel movement since 1972.

In many cases within active meander areas, there were slight gaps between successive mapped historical channel locations indicating that the channel had probably moved smoothly through that area, but the multiple dates of historical photography obtained for the study did not happen to fall within the period of time when the river channel was in that position. In this case, the entire area was assumed to have been part of the river channel at one time from 1972 forward.

In other cases, the gaps between historical channel locations were larger and located in reaches of the river where avulsions (jumps in the channel) were more likely. An example of this is the recent avulsion in the Echota Bend area. This cut was first visible forming in recent floodplain deposits in the photography of 2003 and by 2008 was carrying the main flow of the river. By 2008, the new channel formed by the avulsion had already meandered on its outside bend approximately 150 feet to the north of the original channel cut. In dealing with avulsions in this study, only the mapped surface areas of the historical channel locations were used in my area calculations. Gaps between the historical channels were not included in my surface measurements.

The surface area of changed channel was measured only on the western half of the Illinois River starting just above Lake Tenkiller and extending to the location of the Lake Frances dam that failed. The changed western channel area based on measurements using the GIS is 886 acres.

The channel upstream and east of the Lake Frances dam was much more stable and narrower than the western half of the river. In some reaches because of overhanging vegetation cover, the banks were difficult to map in the aerial photography. As a result, channel movement was difficult to measure accurately. However, the large area of post dam closure muds that formed behind the failed dam which are now visible on dry land provide evidence that significant volumes of sediments were being transported even within a relatively stable portion of the river.

The second step in computing sediment volume was to determine the average thickness of sediments cut in various reaches by the movement of the channel across the recent floodplain and often into older stream terrace deposits. Using a digital stereoplotter, multiple elevation measurements were made of the river bed, river surface, recent floodplain above the river surface and stream terraces tangent to meanders with active cut banks. Based on the other dates of photography obtained in this study, the river at the time of the recent photomission in December 2008 appeared to be at a lower than normal stage.

The elevation measurements were accomplished with a digital stereoplotter by running multiple transects spaced approximately 250 meters apart across the stream channel. A total of 165 transects were utilized. Each elevation transect contained an average of 30 spot elevations. In most areas, the river water was so clear that it was possible to map the surface elevations of the river bed. I had not expected to be able to do this when I planned the photomission, because my experience had been that river water is usually too turbid. The locations of the elevation transects are depicted in Attachment B on Figures 1 through 7.

The surface elevations obtained fall into four categories: river bed, river surface, recent floodplain and older stream terraces. The recent floodplain deposits had been reworked and relocated by the river much more recently than the terrace deposits whose sediments have probably been in place for hundreds or more years. In addition, the thalweg, active cut banks and terrace slopes were also mapped.

In a later step in the study, I again used the digital stereoplotter to view the photography and spot elevations simultaneously so as to deselect the spot elevations in locations which were not representative (too high in elevation) of the terrain through which the river channel had moved.

For the purpose of this study on any given stereoplotter transect, it is my opinion that the average elevation of the land surface outside the river channel minus the elevation of the deepest point of the river bed provides the best approximation of the thickness of the sediments cut by the river as it meandered through the area.

The average thickness of the channel cut was determined for each of eight individual channel reaches. Each reach contained from three to twenty five elevation transects. The December 12, 2008 photomission did not contain continuous photography of all of the reaches as some of the reaches contained stable areas of the river as well as active meander areas. Thus not all portions of the reach may have been photographed. The average thickness of channel cut on the reaches varied from a low of 8.94 feet to a high of 12.48. The average thickness of all channel cuts is 10.8 feet.

The elevation measurements attached in table 1 show that at the time of the Aero-Data photomission, the recent floodplain deposits and terrace deposits averaged 8.3 feet higher in elevation than the river water as measured at the land/water contact. Terrace deposits were higher than the recent floodplain and much more variable in elevation. The deepest point of the river bed was typically 2.5 feet below the land/water contact. The thickness of sediments cut and moved within the recent floodplain by a typical shift of the river bed is approximately 10.8 feet. The average thickness of channel cuts is listed individually by reach in table 2.

This cut thickness,10.8 feet, times the surface area of new channel (river channel outside the 1972 channel position), 38,594,160 square feet (or 886 acres), equals 416,816,928 cubic feet (or approximately 15,500,000 cubic yards) which is the volume of sediments moved. This assumes that the floodplain and river bed have maintained the same basic profile over the past thirty five years. I used the deepest point of the river bed, because it is my understanding that during high flow events (floods) the channel is scoured out and thus temporarily deepened by the rapidly moving water. As the rate of flow decreases, the elevation of the river bed likely increases back to pre-flood levels.

The movement of the river channel was normally confined within the extents of the recent floodplain. However, there were many areas where, during the period of the study, the river was cutting into much older, elevated terrace deposits such as in the Echota Bend area. At Echota Bend at the time of the recent photomission, the water depth was approximately 3 feet and the terrace surface was 15 feet higher than the water surface. The thickness of the cut caused by the meander was thus 18 feet. In this area, between 1958 and 1997 the channel shifted up to 460 feet to the west and eroded away 202,000 square feet (4.6 acres) of farm land.

Assuming a cut thickness of 18 feet at the Echota Bend area, the volume of terrace deposits eroded by the river in that area from 1958 to 1995 is 3,636,000 cubic feet (approximately 135,000 cubic yards). After 1997, a bank stabilization project was completed which halted (for the time being) further movement of the channel to the west.

From 1972 to 1995 (within the time frame of this study), a surface area of 108,000 square feet totaling 1,944,000 cubic feet (approximately 72,000 cubic yards) of older sediments from former (hay and/or pasture land) were eroded in that area and moved down stream by the river after which the stabilization project halted further migration (Attachment B Figure 8). The channel also gradually shifted 200 feet to the west by 1995. By 2005, as a result of an avulsion of the main channel which developed approximately 1,000 feet to the southeast of the stabilization project structures, the entire portion of the bend has been virtually cut off and no longer carries the main flow of the river. The avulsion shortened the channel by approximately 2,000 feet. The 72,000 cubic yards cut by the river after 1972 in the Echota Bend area are included in the 15,500,000 cubic yards cut in the western half of the river.

In other areas elevated, eroding banks generally on the outside bends of meanders were visible where the river was butting up against and cutting into older terrace deposits rather than lower elevation recent floodplain deposits. Often, the steep banks were un-vegetated and on occasion evidence of clumps of recently caved bank sediments were visible in the waters of the channel. These clumps were visible because the water in the river was unusually clear. The total length of these unstable banks mapped by me from the current high resolution aerial photography is 36,715 feet or 6.95 miles.

The section of the river upon which I have measured channel erosion is approximately 59 miles long and extends from above the Lacustrine and transition zones of Lake Tenkiller upstream to the failed Lake Frances dam. My mapping shows that since 1972, 15,500,000 cubic yards of sediment have been relocated within this section of the river. This is equivalent to approximately 263,000 cubic yards of sediment per river mile. I would expect that only a fraction of this sediment has reached Lake Tenkiller at this time as most of it is deposited down stream a short distance from its previous position within the floodplain. The sediments eroded from the river banks would have a negative impact on water clarity.

The erosion I have detected through aerial mapping of the main channel does not include the sediments resulting from soil erosion of agricultural lands and commercial/ residential development transported by river tributaries into the main channel. It also does not include the sediments eroded from the banks of the tributaries.

Dr. Fisher in his report of May 15, 2008 provided information on the thickness as well as chemical analyses of sediments deposited in Lake Tenkiller following construction of the dam. He indicated that that the "post dam sediments tend to be thickest within the lacustrine and transition zones of the lake where the sediments are typically approximately 1.6 feet thick." His report had little to say about the impacts of river channel erosion on water quality or its contribution to the accumulation of post dam sediments in Lake Tenkiller. I found nothing in Dr. Fisher's report that conflicted with my findings.

I have also reviewed the reports written by Russell Dutnell concerning streambank erosion in northeast Oklahoma and in the Illinois River. I have also reviewed Mr. Dutnell's deposition transcript. I found nothing in these materials that conflicted with my findings.

AERO-DATA CORPORATION

Attachment A
Information Relied Upon

DOCUMENT/ PHOTO DATE	DOCUMENT/ PHOTO SOURCE	PHOTO RATIO	FILM TYPE	ROLL NUMBER	FRAMES FOR PROJECT	DESCRIPTION	RESEARCH STATUS
6/27/1958	USDA	20000	BW	7V	49-50	Stereo Aerial Photography	2
11/12/1964	USDA	20000	BW	2FF	212-213	Stereo Aerial Photography	2
1/1/1970	MAPEXPRESS	24000	MAP			7.5 Minute Quad Map DRG Gallatin, Robinson, Wheeler, Prairie Grove, Strickler	2
1/1/1972	MAPEXPRESS	24000	MAP			7.5 Minute Quad Map DRG Moodys, Talequah, Proctor, Kansas, Siloam Springs NW, Siloam Springs, Watts, Cheney	2
4/4/1972	USDA	40000	BW	272	124-125	Stereo Aerial Photography	2
1/1/1973	MAPEXPRESS	24000	MAP			7.5 Minute Quad Map DRG Park Hill	2
11/28/1979	USDA	40000	BW	179	101-102	Stereo Aerial Photography	2
7/22/1984	USDA	58000	CIR	3084	88-89	Stereo Aerial Photography	2
4/24/1991	USDA	40000	BW	5190	18-19	Stereo Aerial Photography	2
3/3/1994	USGS	40000	BW		used in study	DOQQS: Watts; Gallatin; Prairie Grove; Robinson; Siloam Springs; Strickler; Wheeler;	2
3/15/1994	USGS	40000	BW		used in study	DOQQS: Fayetteville (NE, SE); Bentonville South (NE, SE); Springdale (NE, SE)	2
2/18/1995	USGS	40000	BW		used in study	DOQQS: Fayetteville (NW, SW); Springdale (NW, SW)	2
2/25/1995	USGS	40000	BW		used in study	DOQQS: Moodys; Proctor (NE, SE); Kansas (NW, SW); Chewey	2
3/21/1995	USGS	40,000	BWN	8436	48-49	Stereo Aerial Photography	2
3/21/1995	USGS	40000	BW		used	DOQQS: Park Hill (NE, SE); Tahlequah (NE, SE);	2
3/23/1995	USGS	40000	BW		used	DOQQS: Park Hill NW, SW; Proctor NW, SW; Siloam Springs NW; Tahlequah (NW, SW); Kansas (NE, SE);	2
3/26/1996	USGS	40000	BW		used	DOQQS: Bentonville South (NW, SW)	2
9/19/1997	Report					Dutnell, Russell C. P.E., "Echota Bend Bank Stabilization Project : Implementation Report"	2
1/1/1999	Paper					Harmel, R, Haan, C.T., and Dutnell, R., "Bank Erosion and Riparian Vegetation Influences: Upper Illinois River, Oklahoma" Transactions of the ASAE, Vol42(5): 1321-1329	2
2/1/1999	Paper					Harmel, R, Haan, C.T., and Dutnell, R., "Evaluation of Rosgen's Streambank Erosion Potential Assessment in Northeast Oklahoma" Journal of the American Water Resources Association, Vol 35, No. 1, 2/99.	2
2/5/2001	USGS	40000	CIR		used	DOQQS: Rogers (NE, SE)	2
2/19/2001	USGS	40000	CIR		used	DOQQS: Bentonville South (NE, NW, SE, SW); Fayetteville (NE, NW, SE, SW); Springdale (NE, NW, SE, SW); Rogers (NW, SW)	2
1/1/2003	USDANAIP	40000	COL		.sid	NAIP Ortho Imagery	2
1/1/2004	USDANAIP	40000	COL		.sid	NAIP Ortho Imagery	2
1/1/2005	USDANAIP	40000	COL		.sid	NAIP Ortho Imagery	2
1/1/2006	USDANAIP	40000	COL		.sid	NAIP Ortho Imagery	2

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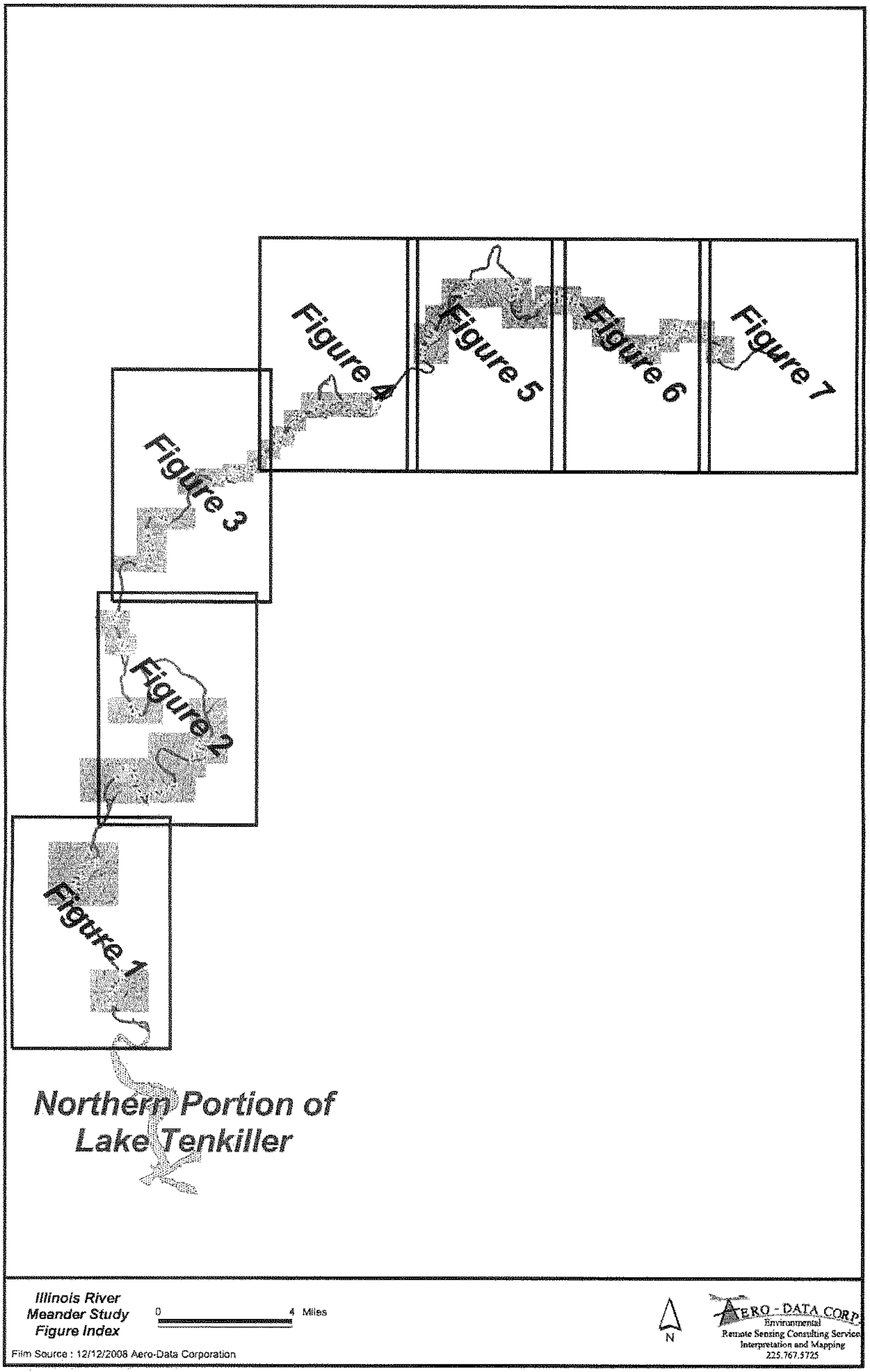
Attachment A
Information Relied Upon

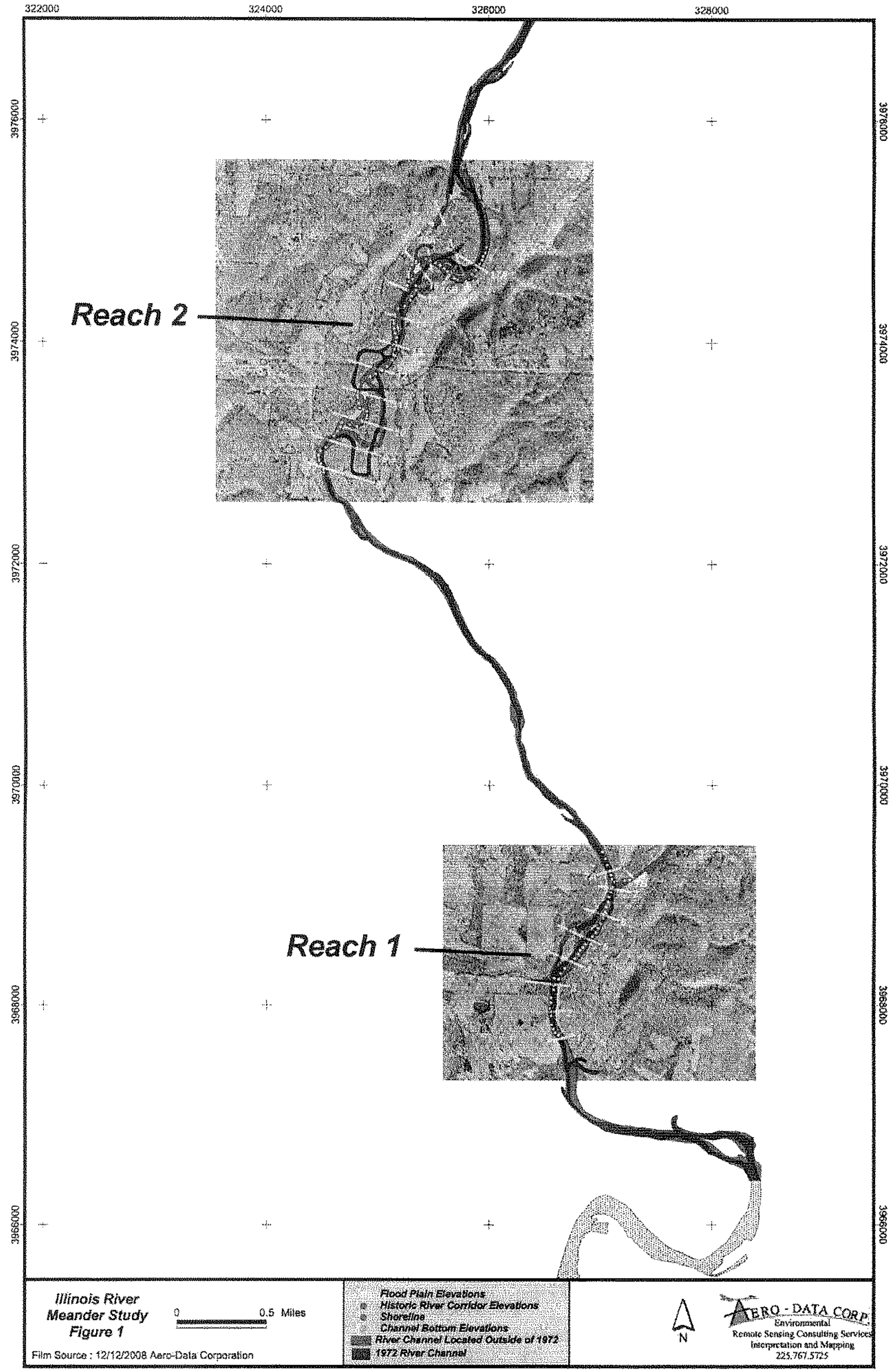
DOCUMENT/ PHOTO DATE	DOCUMENT/ PHOTO SOURCE	PHOTO RATIO	FILM TYPE	ROLL NUMBER	FRAMES FOR PROJECT	DESCRIPTION	RESEARCH STATUS
11/15/2007	Deposition					Deposition of Russell Dutnell on behalf of the Defendants 11/15/2007	2
1/1/2008	USDANAIP	40000	COL		.sid	NAIP Ortho Imagery	2
5/15/2008	Report					Fisher, J. Berton, Expert Report in the matter of State of Oklahoma et al. v. Tyson Foods et al. 5/15/2008	2
12/12/2008	Aero-Data	6000	BW			Stereo Aerial Photography	2

Attachment B



Illinois River
Meander Study
Figure Index

Film Source : 12/12/2008 Aero-Data Corporation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Illinois River
Meander Study
Figure 1
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0.5 Miles
Film Source : 12/12/2008 Aero-Data Corporation
Flood Plain Elevations
Historic River Corridor Elevations
Shoreline
Channel Bottom Elevations
River Channel Located Outside of 1972
1972 River Channel
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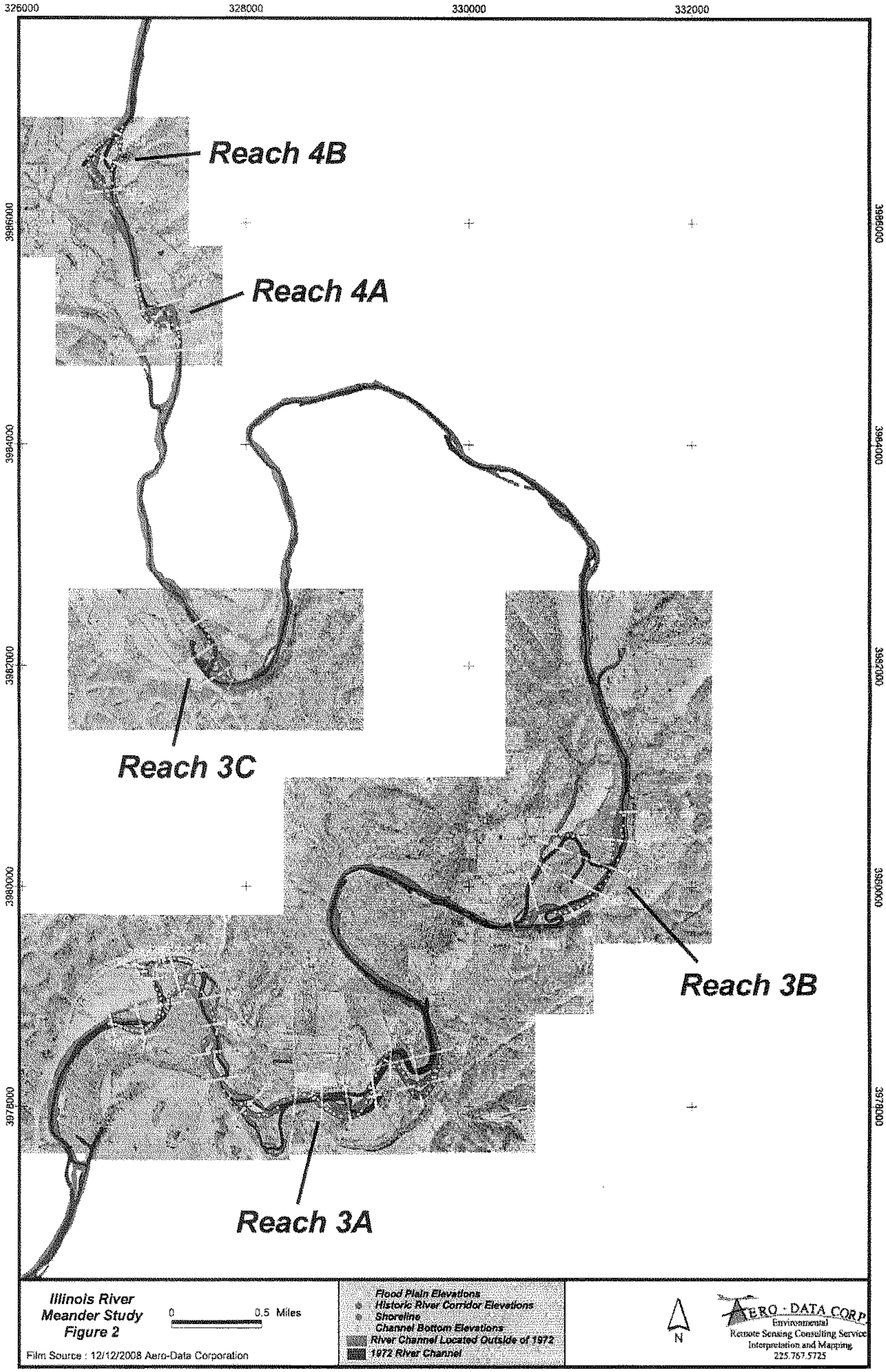
AERO - DATA CORP.
Environmental
Remote Sensing Consulting Services
Interpretation and Mapping
225.767.5725



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Reach 4A
Reach 3C
Reach 3B
Reach 3A
Illinois River
Meander Study
Figure 2
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0.5 Miles
Film Source : 12/12/2008 Aero-Data Corporation
Flood Plain Elevations
Historic River Corridor Elevations
Shoreline
Channel Bottom Elevations
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Interpretation and Mapping
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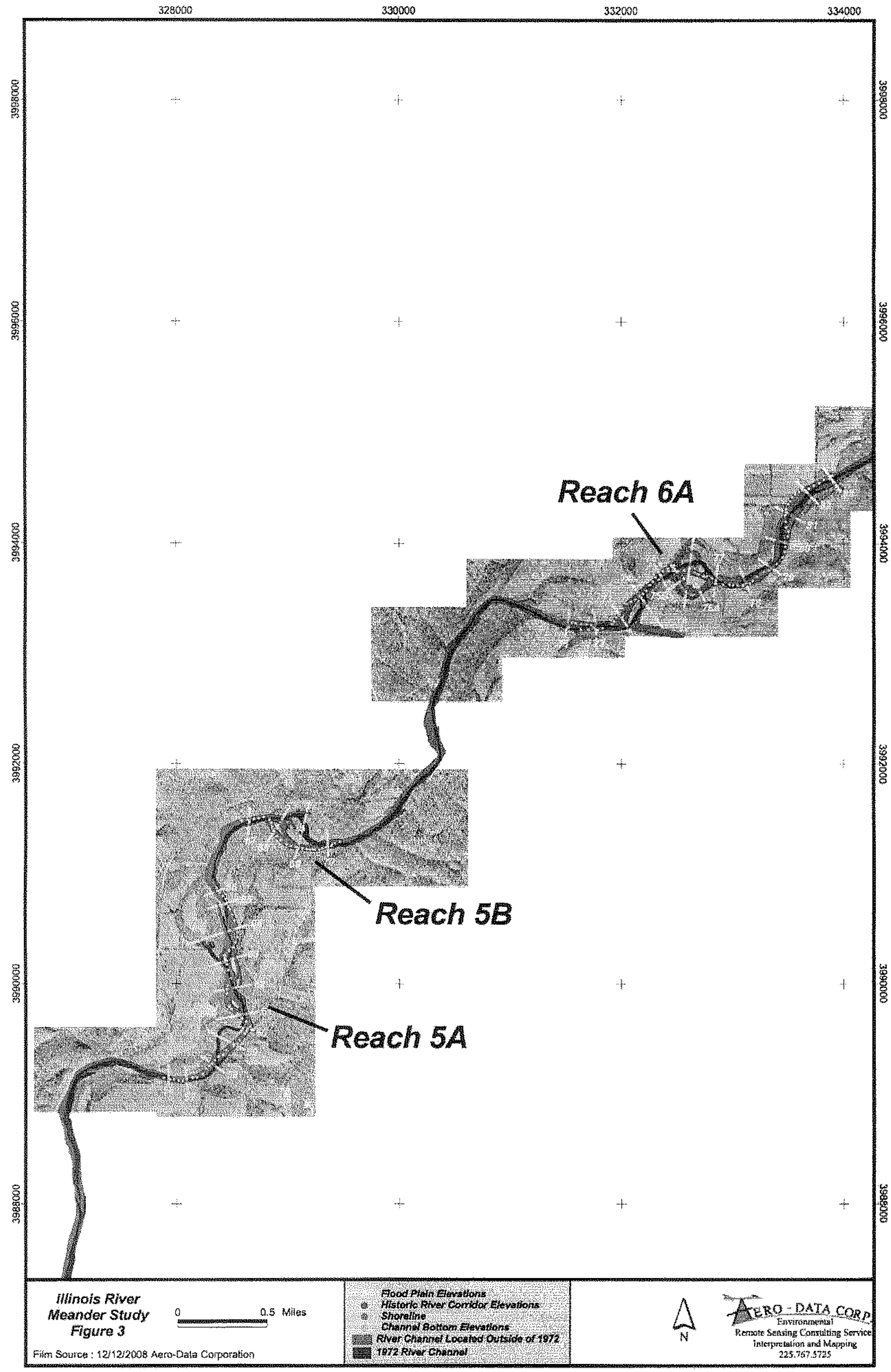
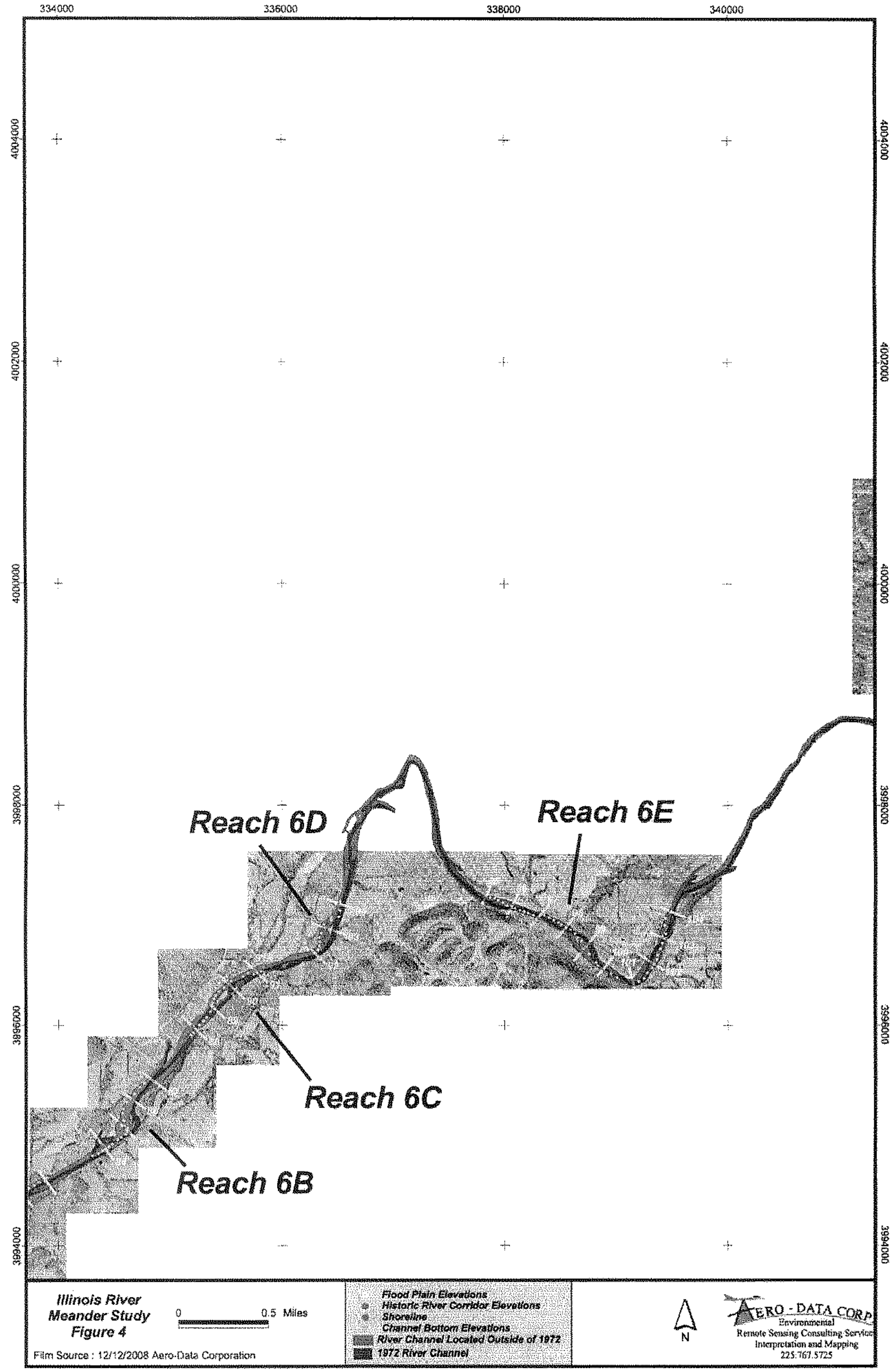


Illinois River Meander Study
Figure 3

Film Source : 12/12/2008 Aero-Data Corporation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Reach 6E
Reach 6C
Reach 6B
Illinois River
Meander Study
Figure 4
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Film Source : 12/12/2008 Aero-Data Corporation
Flood Plain Elevations
Historic River Corridor Elevations
Shoreline
Channel Bottom Elevations
River Channel Located Outside of 1972
1972 River Channel
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Remote Sensing Consulting Service
Interpretation and Mapping
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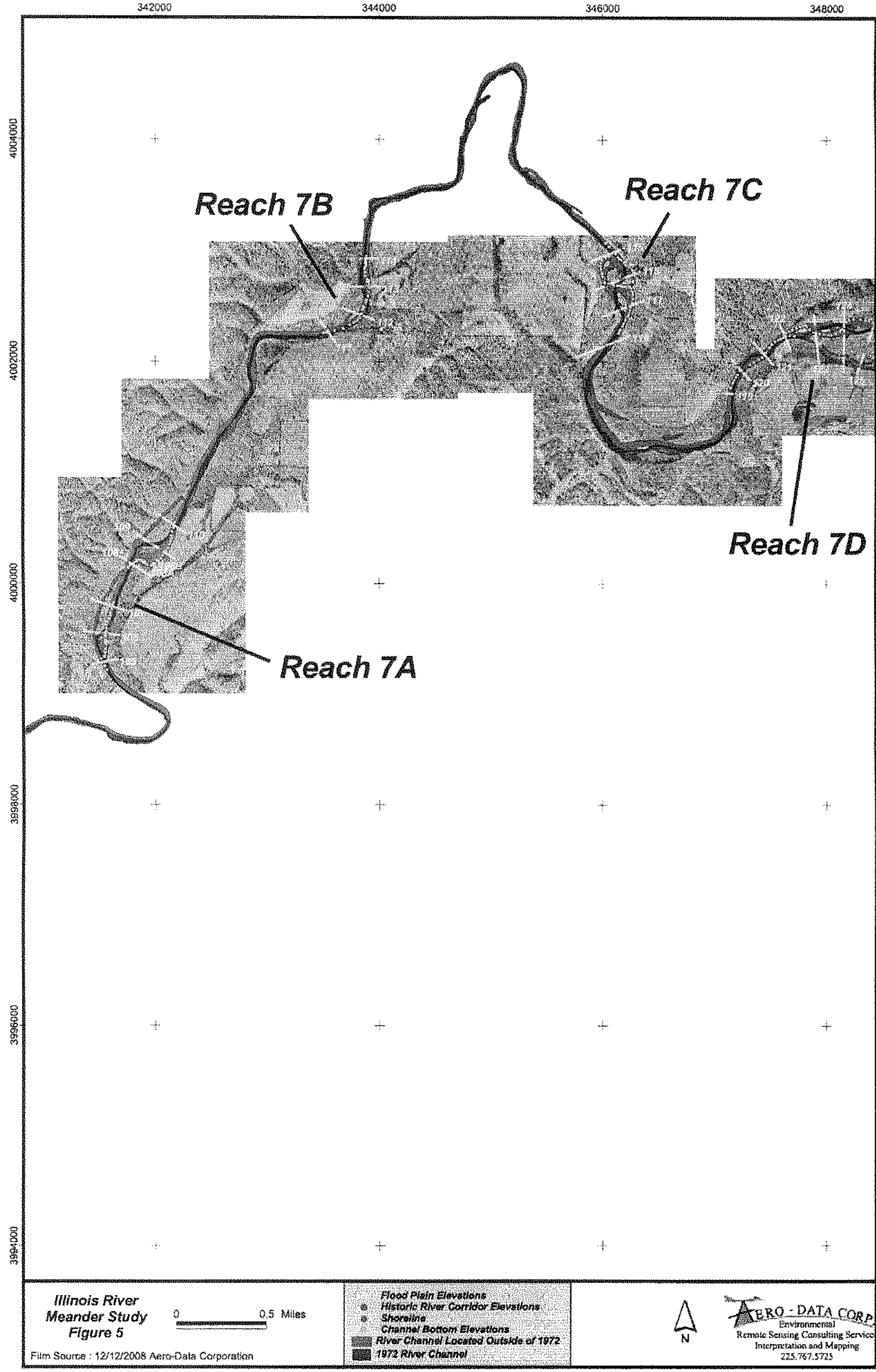
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Illinois River
Meander Study
Figure 5
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Film Source : 12/12/2008 Aero-Data Corporation
Flood Plain Elevations
Historic River Corridor Elevations
Shoreline
Channel Bottom Elevations
River Channel Located Outside of 1972
1972 River Channel
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Interpretation and Mapping
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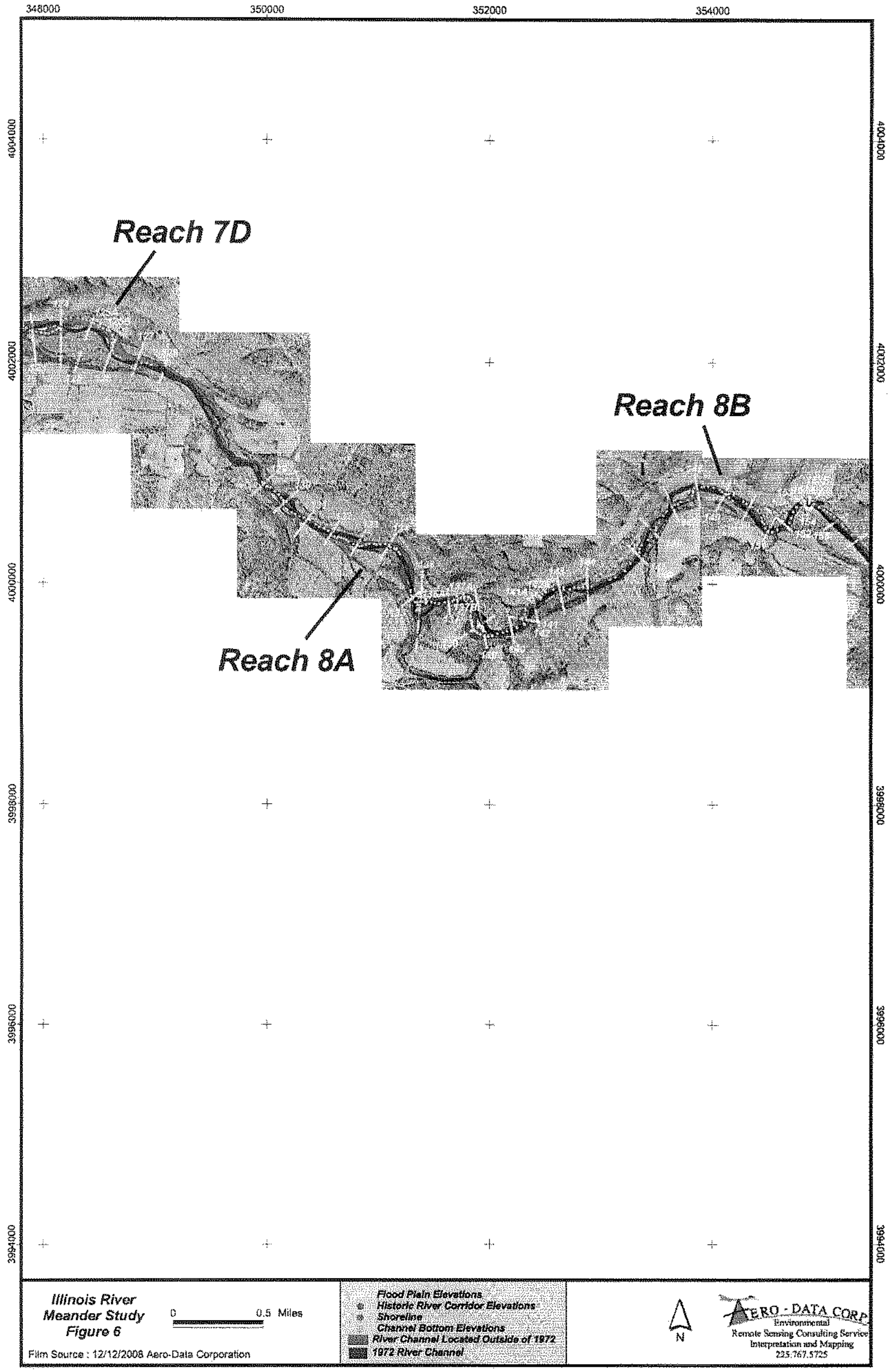
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Reach 8A
Illinois River
Meander Study
Figure 6
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0.5 Miles
Film Source : 12/12/2008 Aero-Data Corporation
Flood Plain Elevations
Historic River Corridor Elevations
Shoreline
Channel Bottom Elevations
River Channel Located Outside of 1972
1972 River Channel
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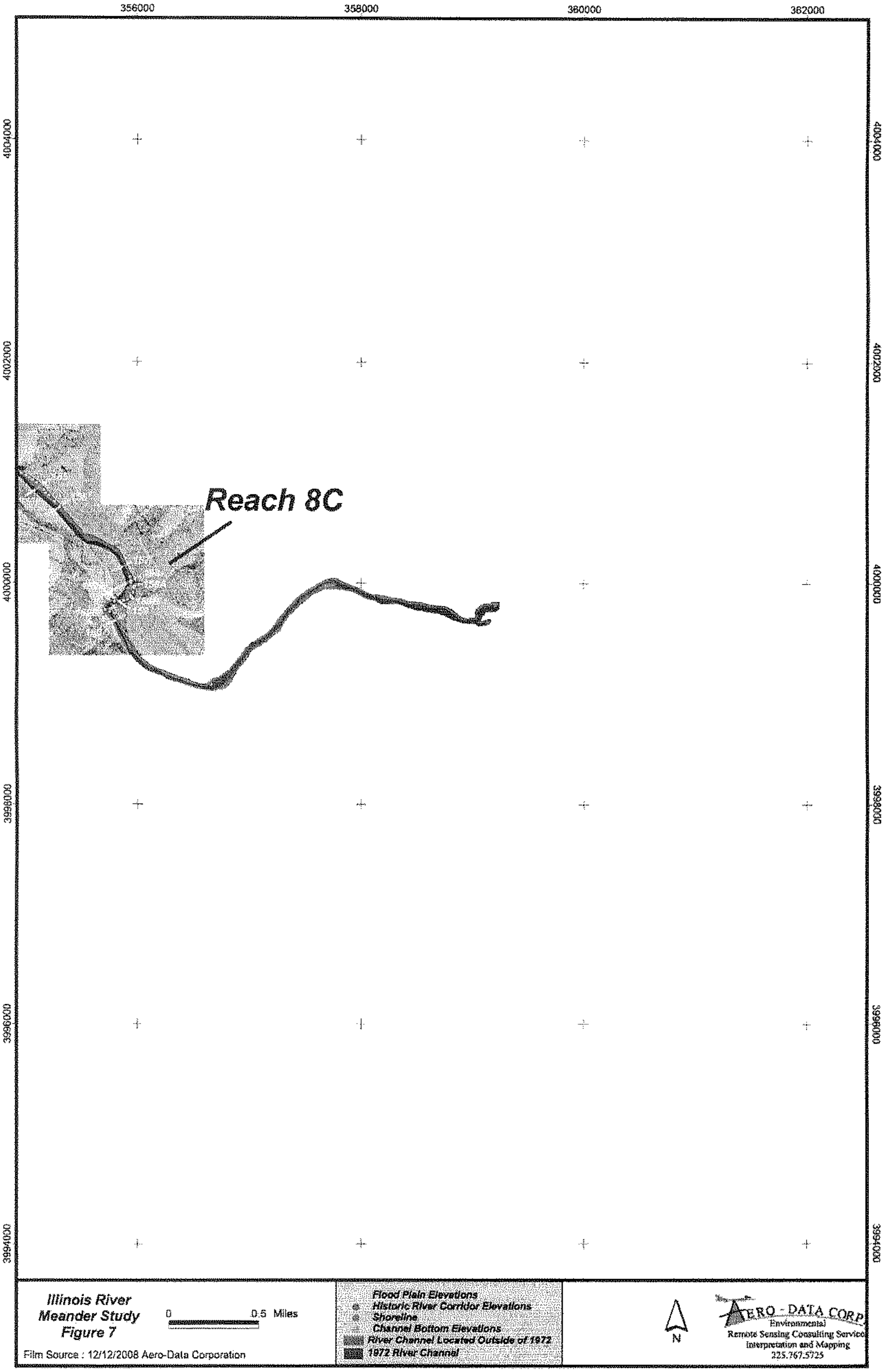
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Reach 8C
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Meander Study
Figure 7
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Film Source : 12/12/2008 Aero-Data Corporation
Flood Plain Elevations
Historic River Corridor Elevations
Shoreline
Channel Bottom Elevations
River Channel Located Outside of 1972
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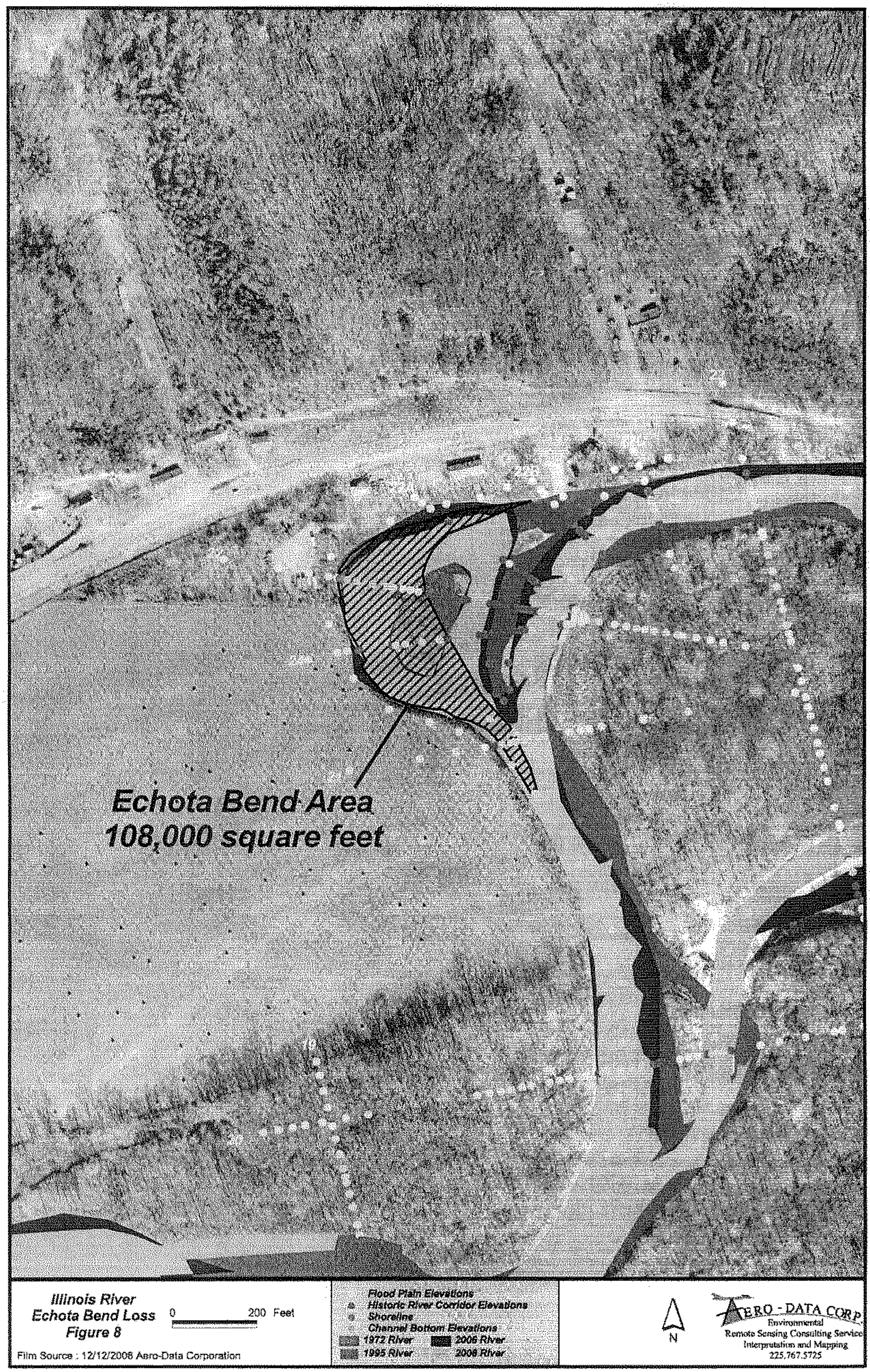

Illinois River
Echota Bend Loss
Figure 8

Film Source : 12/12/2008 Aero-Data Corporation

Average Thickness of Floodplain Material Cut Across All Transects TABLE 1

Transect	*Flood Plain Average Elevation*	*Channel Bottom Elevation*	*Cut Thickness (Feet)*	*Shoreline Elevation*	*Reach*
1	639.88	625.22	14.66	632.05	1
2	640.44	629.98	10.46	632.67	1
3	641.68	631.88	9.80	633.78	1
4	642.47	633.23	9.24	634.87	1
5	641.25	633.23	8.02	635.59	1
6	641.68	633.13	8.55	635.62	1
7	640.98	633.26	7.72	636.08	1
7A	641.6	633.19	8.41	636.08	1
7B	645.31	633	12.31	636.9	1
8	664.53	651.11	13.42	655.7	2
9	661.77	654.16	7.61	655.77	2
10	662.6	653.37	9.23	656.42	2
11	661.71	652.65	9.06	656.65	2
12	663.38	654.29	9.09	657.34	2
13	663.17	655.5	7.67	657.51	2
14	666.22	655.11	11.11	657.57	2
15	663.12	656.26	6.86	657.9	2
16	664.44	655.14	9.30	658	2
18	680.75	673.22	7.53	675.81	3
19	682.9	675.29	7.61	675.81	3
20	684.8	674.6	10.20	676.73	3
21	683.35	674.5	8.85	677.09	3
25	686.14	676.3	9.84	680.24	3
26	687.33	678.47	8.86	681.06	3
27	688.17	680.24	7.93	683.06	3
28	689.91	680.01	9.90	683.69	3
29	691.12	681.59	9.53	685.49	3
30	692.11	684.11	8.00	686.08	3
31	693.48	684.01	9.47	687.49	3
32	696.12	684.51	11.61	688.21	3
33	696.94	686.51	10.43	688.31	3
34	696.5	686.11	10.39	691.89	3
35	696.27	688.44	7.83	690.58	3
38	708.4	696.94	11.46	700.94	3
39	709.38	699.56	9.82	702.94	3
40	710.87	699.83	11.04	703.96	3
41	710.98	701.83	9.15	704.35	3
42	712.67	705.67	7.00	707.11	3
43	717.43	706.36	11.07	707.57	3
46	735.9	722.56	13.34	724.34	3
47	731.84	723.94	7.90	725.81	3
48	732.69	726.24	6.45	727.88	3
49	741.77	730.14	11.63	731.88	4

Average Thickness of Floodplain Material Cut Across All Transects TABLE 1

Transect	Flood Plain Average Elevation	Channel Bottom Elevation	Cut Thickness (Feet)	Shoreline Elevation	Reach
50	738.87	727.71	11.16	732.01	4
50A	736.3	729.29	7.01	732.08	4
50B	738.66	729.98	8.68	732.9	4
51	740.31	731.26	9.05	733.65	4
52	739.63	731.16	8.47	733.39	4
53	747.07	735.95	11.12	737.79	4
54	747.13	737.66	9.47	740.64	4
55	754.35	739.59	14.76	743.2	4
56	758.74	746.45	12.29	748.06	5
57	764.89	746.81	18.08	749.27	5
58	764.1	748.09	16.01	750.02	5
59	760.72	747.83	12.89	750.58	5
60	759.38	745.86	13.52	750.58	5
61	759.36	749.17	10.19	751.01	5
62	762.07	750.78	11.29	752.45	5
63	760.94	750.06	10.88	754.81	5
64	760.93	754.42	6.51	756.03	5
65	763.39	754.81	8.58	757.77	5
66	764.61	754.42	10.19	758.59	5
67	772.37	761.24	11.13	763.05	5
68	768.5	761.24	7.26	763.21	5
69	769.91	761.11	8.80	763.21	5
70	772.92	761.83	11.09	765.02	5
71	784.8	767.94	16.86	770.33	6
72	780.54	767.81	12.73	771.81	6
73	780.91	770.36	10.55	772.56	6
74	782.53	771.15	11.38	773.88	6
75	783.89	771.94	11.95	774.63	6
76	781.68	774.33	7.35	777.02	6
77	785.59	775.81	9.78	777.81	6
78	788.05	776.66	11.39	779.09	6
79	795.72	776.14	19.58	779.45	6
80	791.24	776.47	14.77	779.55	6
81	791.41	775.19	16.22	779.49	6
82	788.89	776.66	12.23	779.49	6
83	790.48	776.57	13.91	779.68	6
84	791.85	776.93	14.92	779.42	6
85	791.65	777.35	14.30	779.81	6
86	788.83	777.35	11.48	781.58	6
87	790.58	779.26	11.32	782.37	6
88	791.03	781.32	9.71	783.59	6
89	793.85	779.03	14.82	783.62	6
90	793.52	780.44	13.08	784.34	6

Average Thickness of Floodplain Material Cut Across All Transects TABLE 1

Transect	Flood Plain Average Elevation	Channel Bottom Elevation	Cut Thickness (Feet)	Shoreline Elevation	Reach
91	792.25	781.85	10.40	784.64	6
92	800.71	784.11	16.60	785.98	6
93	795.95	783.88	12.07	786.9	6
94	799.3	783.88	15.42	788.15	6
95	804.21	794.74	9.47	797.43	6
96	807.41	796.35	11.06	799.17	6
97	805.07	796.45	8.62	799.43	6
98	809.54	796.45	13.09	799.73	6
99	809.14	799.07	10.07	801.04	6
100	810.24	799.43	10.81	802.42	6
101	812.31	801.43	10.88	802.91	6
102	815.51	801.43	14.08	804.22	6
103	813.63	804.45	9.18	805.86	6
104	816.14	801.86	14.28	806.85	6
105	821.19	810.39	10.80	812.65	7
106	820.66	812.19	8.47	814.36	7
107	823.17	815.38	7.79	816.2	7
108	825.97	815.38	10.59	817.54	7
108A	826.12	816.95	9.17	818.85	7
108B	825.06	818.1	6.96	818.85	7
109	823.6	817.12	6.48	819.84	7
110	826.36	819.48	6.88	820.66	7
111	837.73	822.76	14.97	824.27	7
112	834.63	822.96	11.67	825.55	7
113	835.18	825.48	9.70	827.25	7
114	834.79	827.32	7.47	828.99	7
115	852.85	838.18	14.67	842.87	7
116	849.14	842.31	6.83	843.17	7
117	851.99	842.48	9.51	844.48	7
118	853.52	843.89	9.63	845.49	7
119	861.8	851.11	10.69	852.42	7
120	859.01	847.79	11.22	851.66	7
121	858.6	851.07	7.53	853.14	7
122	863.72	850.81	12.91	853.2	7
123	859.86	853.5	6.36	855.27	7
124	862.15	854.58	7.57	855.6	7
125	863.66	855.04	8.62	856.75	7
125A	867.71	855.6	12.11	857.21	7
125B	871.15	855.27	15.88	857.14	7
126	865.87	856.98	8.89	858.45	7
127	863.71	860.55	3.16	860.95	7
129	871.01	858.26	12.75	861.57	8
130	871.5	860.85	10.65	861.96	8

Average Thickness of Floodplain Material Cut Across All Transects TABLE 1

Transect	*Flood Plain Average Elevation*	*Channel Bottom Elevation*	*Cut Thickness (Feet)*	*Shoreline Elevation*	*Reach*
131	878.31	862.95	15.36	864.85	8
132	874.77	863.11	11.66	865.7	8
133	874.63	863.34	11.29	865.57	8
134	871.85	865.51	6.34	866.98	8
135	879.5	864.92	14.58	869.12	8
136	878.09	867.35	10.74	869.18	8
136A	878.78	868.07	10.71	869.31	8
137	879.78	867.97	11.81	870.33	8
138	878.14	869.84	8.30	872.33	8
139	878.1	871.28	6.82	873.35	8
140	884.22	872.33	11.89	873.41	8
141	881.25	872.14	9.11	874.33	8
141A	887.14	873.05	14.09	875.12	8
142	882.96	872.3	10.66	875.12	8
142A	884.85	871.54	13.31	875.12	8
143	883.45	872.56	10.89	875.28	8
144	881.03	873.68	7.35	875.25	8
145	884.99	872.36	12.63	875.25	8
146	886.5	872.3	14.20	875.68	8
147	884.99	872.5	12.49	876.4	8
148	886.24	872.63	13.61	877.48	8
149	887.19	874.86	12.33	877.58	8
150	885.62	875.94	9.68	878.96	8
152	887.45	877.32	10.13	880.04	8
153	891.34	877.52	13.82	880.6	8
153A	894.46	877.42	17.04	880.63	8
153B	889.59	877.48	12.11	880.8	8
154	891.7	879.75	11.95	880.96	8
155	891.1	880.57	10.53	882.08	8
156	895.2	881.09	14.11	883.39	8
158	897.41	884.18	13.23	886.7	8
158A	892.29	884.83	7.46	887.19	8
158B	894.2	885.68	8.52	887.36	8
159	901.55	885.29	16.26	887.75	8
159B	898.4	886.01	12.39	888.05	8
160	900.77	887.26	13.51	888.08	8
Average			*10.81*		

Average Thickness of Floodplain Material Cut Per Individual Reach TABLE 2

Reach	*Average Thickness*
Reach 1	9.91
Reach 2	9.26
Reach 3	9.38
Reach 4	10.15
Reach 5	11.25
Reach 6	12.48
Reach 7	9.45
Reach 8	11.69

Attachment C

Wayne M. Grip, President, Aero-Data Corporation

Education: University of Wisconsin, Madison. BS in Geology (1966)
University of Wisconsin, Madison. Graduate studies in soils and turf-grass agronomy (1970-1971)

Organizations: American Society of Photogrammetry and Remote Sensing
American Congress on Surveying and Mapping

Professional Experience:

11/1/87 to Present Aero-Data Corporation, Baton Rouge, LA.
President and Principal Owner

Co-founder of Aero-Data Corporation in 1983. Aero-Data specializes in aerial photography and mapping, environmental photointerpretation, and accident site investigations. The company has been in operation for over twenty-two years. It has a complete photolaboratory and two airplanes as well as state of the art aerial mapping cameras, GPS surveying and navigation receivers, photogrammetric scanners, digital stereoplotter / photointerpretation work stations and high resolution, large format computer plotters.

Mr. Grip has over twenty-nine years of experience in his field. As a geologist, cartographer, photographer, photointerpreter and pilot, he designs and directs all aspects of projects involving photointerpretation, photogrammetry, and photography acquisition (includes overflights with Aero-Data aircraft). These projects have amounted to over 1000 sites in 36 different states to date and include historical aerial photography based hazardous waste site investigations, surface mine inspections and permitting, environmental audits, accident site investigations, annual site documentation using aerial photography, video, and thermal imagery, contour mapping of plant sites, stock pile volume determinations, geographic information systems and coastal zone erosion studies. He has provided expert testimony on over twenty-five occasions in federal and state court in the areas of photointerpretation and photogrammetry. His testimony often includes the areas of surface water hydrology and agronomy as it relates to the photointerpretation of surface drainage features and vegetation features.

Under Mr. Grip's direction, the company has developed a client list which includes many of the major corporations and law firms in the United States as well as government agencies such as the U.S. Environmental Protection Agency, U.S. Soil Conservation Service, U.S. Department of Justice, the Louisiana Department of Transportation and Development, the Louisiana Department of Natural Resources, and the Louisiana Department of Environmental Quality.

He has attended numerous seminars on photogrammetry and remote sensing and has given short courses on environmental photointerpretation and mapping for the University of Wisconsin, U.S. Army Corps of Engineers, U.S. Office of Surface Mining, and the Louisiana Department of Environmental Quality.

1/1/83 to 11/1/87 Aero-Data, Inc., Baton Rouge, LA.
Vice-President

Part time employment as one of the principal owners of Aero-Data Corporation while working full time for the Louisiana Department of Natural Resources and later G&E Engineering. The Aero-Data work was conducted on weekends during off duty hours for clients not regulated by the Louisiana Department of Natural Resources. This continued until April 1986 when he began full time employment with Aero-Data as Vice-President in charge of operations. In November of 1987 he became president of Aero-Data and later, the principal owner.

1/1/86 to 4/30/86 G&E Engineering, Inc., Baton Rouge, LA, Program Manager, Photointerpretation and Hydrology

Responsible for conducting historical aerial photography studies, planning and directing field investigations, conducting field testing programs (pump drawdown tests, geophysical tests, etc.), conducting groundwater contamination assessments (including modeling of groundwater flow and contaminant migration). Mr. Grip left G&E Engineering after a short period of time so as to pursue his interests in historical aerial photography studies on a full time basis.

1980 to 12/31/85 Louisiana Office of Conservation, Surface Mining Division, Baton Rouge, LA. Staff Geologist

Responsible for environmental regulation of surface mining in the State of Louisiana. Conducted reviews of highly complex surface mine permit applications and environmental impact statements. Conducted historical aerial photography studies to determine the previous land use of properties scheduled for mining. Developed and implemented a remote sensing monitoring program using a small airplane system to photograph and video tape surface mining operations. Conducted field inspections of exploration drilling and mining operations, oil and gas production sites and oil field waste sites. Participated in reclamation research activities in conjunction with the Soil Conservation Service, Louisiana State University and the potential mining companies. These research activities involved the evaluation of the capability of overburden soil substitutes to support vegetation growth, their susceptibility to water and wind caused erosion and the resultant potential risk for surface water and ground water contamination. Attended numerous seminars on mining and reclamation procedures and consulted with other state and federal regulatory agencies and the industries they regulate.

1974 to 1980 Louisiana Office of Human Development, Baton Rouge, LA, Management Analyst II

Managed two large state wide computer systems used to track services provided to clients and pay vendors for the services delivered. Designed and tested software changes and trained social workers in the use of the systems.

1973 to 1974 Consultant with the North Wood Country Club, Dallas, TX
Delhi Golf Club, Delhi, LA,
Turf Grass Agronomist

Duties for this and the below superintendent position included: environmental permitting operations, budget preparation, design of maintenance programs, equipment purchases and maintenance, surveying, soil sampling, specifying soil mixes, design of drainage systems, design of underground automatic irrigation systems and surface impoundments, siting of deep irrigation wells, conducting turf grass research, staff supervision, and serving on the board of the Wisconsin Golf Course Superintendents Association.

1972 to 1973 Westmoor Country Club, Milwaukee, WI, Golf Course Superintendent

1966 to 1970 Officer, U.S. Air Force, Strategic Air Command
Photointerpreter and Cartographer

Upon graduation from college entered Officer Training School and was commissioned a 2nd Lt in the USAF. Promoted to 1st Lt and then Captain within three years. Captain Grip's primary assignment was to a Reconnaissance Technical Squadron whose mission was to produce air target charts. These charts were used by B52 and FB111 bombers to navigate within specified potential training and target areas. He was placed in charge of a map production unit, which utilized photointerpretation and photogrammetry procedures as the primary source of information. Later he became the officer in charge of a target intelligence center, which researched and distributed maps and photographs to tactical Air Force units worldwide. While in this assignment he designed and implemented a geographic information system (GIS) for the center. This was one of the first GIS's to be implemented in the United States. Received the Air Force Commendation Medal upon release from active duty in recognition of this achievement.

Attachment D

Expert Testimony of Wayne Grip in the Past Five Years

Trial testimony is listed first followed by deposition testimony

Trial Testimony

TYPE OF WORK

November 10, 2003
Superior Court Hillsborough County, New Hampshire (Northern District)
Shelia Longden v. Philip Morris USA
Docket No: 00-C-0462 — Photointerpretation & Photogrammetry
Study of Herbicide Spray missions in Vietnam in comparison with Mr. Longden's unit location and service times.
Philip Morris USA was the client.

March 21/22, 2005
U.S.D.C. (Southern District of New York)
Olin Corporation v. Insurance Company of North America, et al.
Civil Action No. 84 Civ. 1968 (TPG) — Photointerpretation & Photogrammetry
Historical photography study of multiple sites in Niagara Falls, New York.
Olin was the client.

April 7/8, 2005
U.S.D.C. (Eastern District of Texas)
Lyondell Chemical Company, et al. v. Albemarle Corporation, et al.
Civil Action No. 01:01-CV-890 — Photointerpretation & Photogrammetry
Historical photography study Turtle Bayou Site.
PPG (Joint Defense Group) was the client.

April 12, 2005
Louisiana 19th Judicial District Court Division H
Johnson v City of Baton Rouge et al.
Civil action No.
Photogrammetry of an accident scene
The plaintiff was represented by Danny Vidrine

November 3, 2005
U.S.D.C. (Southern District of New York)
Olin Corporation v. Insurance Company of North America, et al.
Civil Action No. 84 Civ. 1968 (TPG) — Photointerpretation & Photogrammetry
Historical photography study of two sites in Aberdeen, North Carolina.
Olin was the client.

February 16, 2006
U.S.D.C. (Eastern District of Texas)
Lyondell Chemical Company, et al. v. Albemarle Corporation, et al.
Civil Action No. 01:01-CV-890 — Photointerpretation & Photogrammetry
Historical photography study Turtle Bayou Site. (Retrial)
PPG (Joint Defense Group) was the client.

February 24, 2006
U.S.D.C. (Southern District of New York)
Olin Corporation v. Insurance Company of North America, et al.
Civil Action No. 84 Civ. 1968 (TPG) — Photointerpretation & Photogrammetry
Historical photography study of a site in McIntosh, Alabama.
Olin was the client.

April 26, 2006 (Class Hearing)
Jesse Fisher, et al. v. Ciba Specialty Chemicals, et al.
U.S.D.C. (Southern District of Alabama)
Civil No. 03-566 (Division WS-B) — Photointerpretation & Photogrammetry
Historical study of a site in McIntosh, Alabama
Ciba was the client.

April 6 and 9, 2007 (Retrial)
U.S.D.C. (Southern District of New York)
Olin Corporation v. Insurance Company of North America, et al.
Civil Action No. 84 Civ. 1968 (TPG) — Photointerpretation & Photogrammetry
Historical photography study of multiple sites in Niagara Falls, New York.
Olin was the client.

April 30, 2007 (Arbitration)
In Re Arbitration Between: XIK Corp., Domtar Inc., and Honeywell International, Inc
Reference Number 1220035101 — Photointerpretation & Photogrammetry

Deposition Testimony — TYPE OF WORK

		Type of Work
10/31/2003	Cutbank, L.L.C. v. City of Bossier City, Louisiana and H&H Contracting Company, Inc First Judicial District Court Caddo Parish, Louisiana Number: 451,463 Section A *Historical study of the movement of a river and land use over time*	Photointerpretation & Photogrammetry
5/18/2004	Lyondell Chemical Company, et al. v. Albemarle Corporation, et al. U.S.D.C. (Eastern District of Texas) Beaumont Division C.A. No. 1:01-CV-890 *Historical photography study of the Turtle Bayou Site.*	Photointerpretation & Photogrammetry
1/4/2005	Carrie Jean LaBauve et al. v. Olin Corporation U.S.D.C. (Southern District of Alabama) C.A. No. 03-567 Division WS-B *Historical study of a chemical plant*	Photointerpretation & Photogrammetry
1/20/2005	Carney Products v. B.J. Carney, et al. *Historical study of a site in Ste. Maries, Idaho*	Photointerpretation & Photogrammetry
3/8/2005	Olin Corporation v. Insurance Company of North America, et al. U.S.D.C. (Southern District of New York) Civil Action No. 84 Civ. 1968 (TPG) *Historical of a chemical plant and other sites in Niagara New York*	Photointerpretation & Photogrammetry
4/26/2005	Massachusetts Electric Co., et al. v. Travelers Casualty & Surety Co., et al Worcester Superior Court Civil Action No. 99-00467B *Historical study of Boston manufactured gas plants*	Photointerpretation & Photogrammetry
5/3&4/2005	Consolidated Edison Company of New York, Inc. v. American Home Insurance Company, et al Supreme Court of the State of New York Index No. 600527/01 *Historical study of New York manufactured gas plants*	Photointerpretation & Photogrammetry
5/12/2005	ANODYNE v U.S.D.C. Miami, Florida Civil Action No. *Historical study of an anodizing plant in Miami Florida*	Photointerpretation & Photogrammetry

10/14/2005	Home Insurance Company v. Cornell-Dubilier Electronics, Inc. et al. Cornell-Dubilier Electronics, Inc. et al. v. United Insurance Company *Historical study of a site in Edgefield, South Carolina*	Photointerpretation & Photogrammetry
10/26/2005	Olin Corporation v. Insurance Company of North America, et al. U.S.D.C. (Southern District of New York) Civil Action No. 84 Civ. 1968 (TPG) *Historical study of two sites in Aberdeen, North Carolina*	Photointerpretation & Photogrammetry
1/10/2006	Plantation Pipeline Co. v. Continental Casualty U.S.D.C. (Northern District of Georgia, Atlanta) Civil Action No. 1-03-CV-2811 *Historical study of a pipeline site near Darbun, Mississippi*	Photointerpretation & Photogrammetry
1/30&31/2006	Otay Land Company, et al. v. U.E. Limited, L.P., et al. U.S.D.C. (Southern District of California) Civil Action No. 03CV2488BEN(POR) *Historical study of a shooting range in Chula Vista, California*	Photointerpretation & Photogrammetry
2/9/2006	Olin Corporation v. Insurance Company of North America, et al. U.S.D.C. (Southern District of New York) Civil Action No. 84 Civ. 1968 (TPG) *Historical study of a site in McIntosh, Alabama*	Photointerpretation & Photogrammetry
3/3/2006	Jesse Fisher, et al. v. Ciba Specialty Chemicals, et al. U.S.D.C. (Southern District of Alabama) Civil No. 03-566 (Division WS-B) *Historical study of a site in McIntosh, Alabama*	Photointerpretation & Photogrammetry
4/12/2006	June Pryor Avance, et al. v. Kerr-McGee Chemical, LLC U.S.D.C. (Eastern District of Texas) Civil No. 5:04-CV-209-DF-CMC *Historical study of a site in Texarkana, Texas*	Photointerpretation & Photogrammetry
2/23/2006	Sarah Clopton, et al. v. Pharmacia Corp. and Pfizer, Inc. U.S.D.C. (Northern District of Alabama-Southern Division) Case No.: CV-03-C-3369-S, CV-03-C-3374-S, CV-03-C-3371-S *Historical Study of a site in Anniston, Alabama*	Photointerpretation & Photogrammetry
2/27/2006	Arbitration between XIK Corp., Domtar Inc. and Honeywell International Reference No. 1220035101	Photointerpretation & Photogrammetry
2/28/2007	Olin Corporation v. Insurance Company of North America, et al. U.S.D.C. (Southern District of New York) Civil Action No. 84 Civ. 1968 (TPG) *Historical study of two sites in Niagara Falls, NY*	Photointerpretation & Photogrammetry
4/25/2007	The Travelers Indemnity Co. v. Orange and Rockland Utilities, Inc. Index No. 603601/02 (N.Y. Sup.) *Historical study of 6 sites in New York*	Photointerpretation & Photogrammetry
5/23/2007	Gary Roth v. Amica Mutual Civil District Court Civil Action No. 05-13528 *Historical study involving house damage in New Orleans, LA*	Photointerpretation & Photogrammetry

11/20/2007	Louisiana Department of Transportation and Development v. Kansas City Southern Railway Company, et al. First Judicial District Court, Parish of Caddo Suit No: 417,190-B *Historical study of a Train Derailment in Shreveport, LA*	Photointerpretation & Photogrammetry
12/17/2007	Celanese Corporation v. Coastal Water Authority, et al. U.S.D.C. (Southern District of Texas-Houston Division) Case No. 4:06-CV-02265 *Historical study of a pipeline rupture in Shoreacres, TX*	Photointerpretation & Photogrammetry
5/12/2008	Ponca Tribe of Indians of Oklahoma, et al. v. Continental Carbon Company et al. U.S.D.C. (Western District of Oklahoma) Case No. CIV-05-445-C *Historical study of a Carbon Plant and Surrounding Areas, OK*	Photointerpretation & Photogrammetry
5/12/2008	Alvarez, et al. v. Continental Carbon Company et al. District Court of Kay County, Oklahoma Case No. CJ-2007-104PC *Historical study of a Carbon Plant and Surrounding Areas, OK*	Photointerpretation & Photogrammetry
8/12/2008	Celanese Corporation v. Coastal Water Authority, et al. U.S.D.C. (Southern District of Texas-Houston Division) Case No. 4:06-CV-02265 *Historical study of a pipeline rupture in Shoreacres, TX (Supplemental Report)*	Photointerpretation & Photogrammetry
9/17/2008	Catena v. Andersen, at al. Superior Court of New Jersey, Bergen County Docket No. BER-L-5914-05 *Historical Study of the area surrounding the Catena Site in Teterboro, New Jersey*	Photointerpretation & Photogrammetry
10/27/2008	Ashley II of Charleston L.L.C. v. PCS nitrogen, Inc. v. 3rd Party Defendants U.S.D.C (District of South Carolina Charleston Division) Case No. 2:05-2782-ACWH *Historical study of the Columbia Nitrogen Site*	Photointerpretation & Photogrammetry

Publications By Wayne Grip

April 2001

Combining Aerial Photography Aerial and Geographic Information Systems in Environmental Forensic Investigations.
In: *Proceedings: Environmental Litigation: Advanced Forensic and Legal Strategies.*
University of Wisconsin. College of Engineering and Professional Development
San Francisco, CA. April 4-5, 2001.

November 2000

Application of Aerial Photography and Photogrammetry in Environmental Forensic Investigations
Wayne M Grip, Randall W. Grip and Robert D. Morrison
Journal of Environmental Forensics (2000) 1, 121-129

April 2000

Advances in Aerial Photography and Photogrammetry for Forensic Investigations and Trial Exhibits.
In: *Proceedings: Environmental Litigation: Advanced Forensic and Legal Strategies.*
University of Wisconsin. College of Engineering and Professional Development
San Francisco, CA. April 13-14, 2000.

November 99

Use of Geographic Information Systems for Effective Courtroom Presentations.
In-House Environmental Protection Agency Training.
In: *Forensics in Environmental Science and Technical Applications.* Chicago, Illinois. November 8-10, 1999.

September 98

Using Historical Aerial Photography to Identify Probable Contaminant Sources.
In: *Proceedings: Environmental Forensics: Determining Liability through Applied Science.* International Business Communications. Houston, Texas. September 24-25, 1998

December 95

Use and Presentation of Aerial Photographs as Evidence.
In: *Proceedings: Environmental Litigation: Hydrocarbons, Chlorinated Solvents and Visual Display of Evidence.* University of Wisconsin, College of Engineering and Professional Development. Kahuku, Oahu, Hawaii. December 1-2, 1995